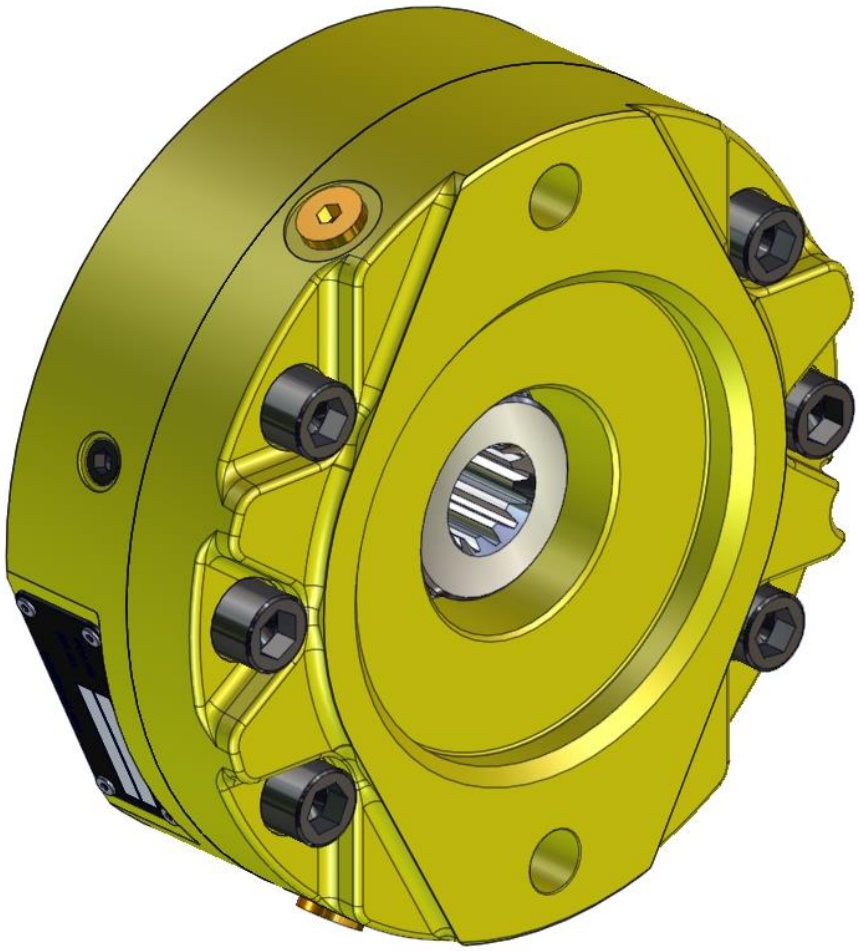
oerlikon
fairfield

Torque-LOCK ™ Static Input Brake
Service Manual
Models: TLH13….



Revised 8/18/2014

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Features and specifications are subject to change without notice.

TORQUE-LOCK ™ Service Manual
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Introduction

This manual is a step-by-step guide to the disassembly and assembly of the specific Torque-Hub® family of units shown on the cover. It is designed for the customer or mechanic who is repairing this particular Torque-Lock ™ model.

Users of this manual should note that each part mentioned is followed by an identification number enclosed in parentheses. These part numbers may be referred to in the Parts List and Assembly Drawing sections of this manual.

Specialized tools used to assemble this unit are noted in the assembly procedures and diagrammed in the Assembly Tools section.

Users should familiarize themselves with the procedures for brake test, roll and leak test, as well as bolt tightening and torquing found on the following nine pages before starting any repairs.

Standard safety practices should be followed during the disassembly and assembly procedures described. Safety glasses and safety shoes should be worn, and heavy, heat resistant gloves should be used when handling heated components. Be especially alert when you see the word **CAUTION**. This indicates that a particular operation could cause personal injury if not performed properly or if certain safety procedures are not followed. The word **NOTE** is used to bring attention to certain procedures or helpful hints that will aid in the disassembly and assembly process.

Brake Test

The Brake Test

1) Connect an appropriate pressure supply to the brake port and slowly increase the pressure to the prescribed pressure in the brake chart to check for correct release pressure, by rotating the brake input with a 13-tooth 16/32 spline shaft with 25 in.-lbs. of torque.

2) Continue increasing the pressure to 3000 psi [200bar] and check that the brake rotates freely, by rotating the brake shaft.

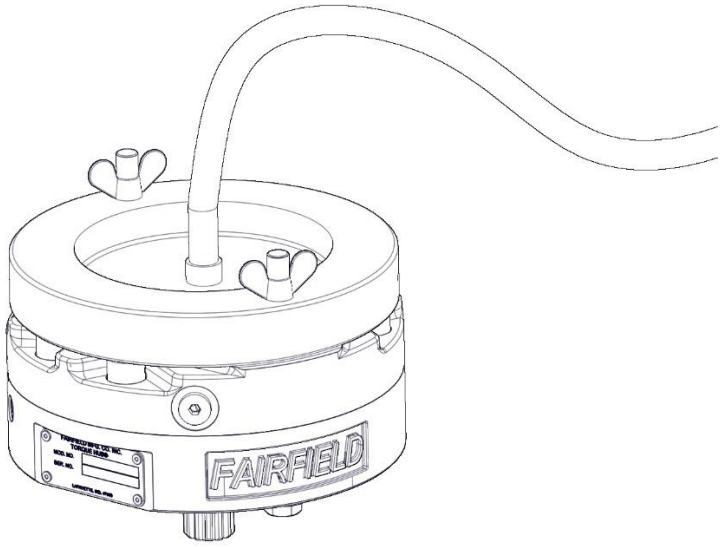
3) Note: Release pressure during bench testing should be limited to 2000 psi [138bar] unless fully installed to a gearbox.

4) The brake should hold 3000 psi [200bar] without leakage.

LAST 3 DIGITS	NO. OF SPRINGS (24) / (23)	INITIAL RELEASE PRESSURE psi	FULL RELEASE PRESSURE psi
16W	12	154-188	188-206
15W	10/2	140-176	172-190
13W	10	129-158	156-172
12W	8/2	115-145	140-156
11W	8	104-127	125-138
09W	6/2	89-114	108-122
08W	6	78-96	93-104
07W	4/2	63-83	77-87
05W	4	52-65	62-70

The Leak Test

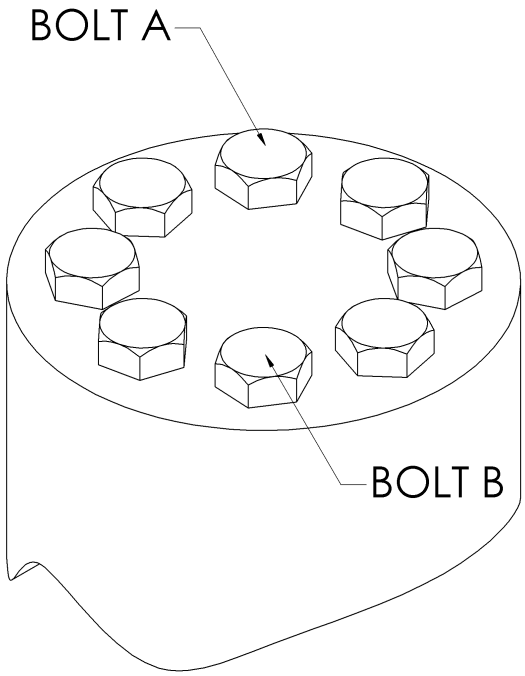
The purpose of a leak test is to make sure the unit is airtight. To perform a leak test use the leak test fixture from the table below. If the tool is not available, the gearbox must be sealed to perform the test. This can be accomplished by replacing one of the oil plugs in the cover with an air chuck. **DO NOT EXCEED 10 PSI PRESSURE DURING THE LEAK TEST.** Higher pressure will create a false sealing effect in assemblies with lip-seals. The unit has a leak if the pressure gauge reading on your leak check fitting starts to fall after the gearbox has been pressurized and allowed to equalize. Leaks will most likely occur at the pipe plugs, the main seal or wherever O-rings or gaskets are located. The exact location of a leak can usually be detected by brushing a soap and water solution around the main seal and where the O-rings or gaskets meet on the exterior of the unit and then checking for air bubbles. If a leak is detected in a seal, O-ring, or gasket, the part must be replaced and the unit rechecked. Leak test at 10 psi for 20 minutes.



Model Code	Leak Test Tool
ALL	T220092

Tightening and Torquing Bolts

If an air impact wrench is used to tighten bolts, extreme care should be taken to ensure the bolts are not tightened beyond their specified torque. The following steps describe how to tighten and torque bolts or socket head cap screws in a bolt circle.



1) Tighten (but do not torque) bolt “A” until snug.
2) Go to the opposite side of the bolt circle and tighten bolt “B” until equally snug.
3) Crisscross around the bolt circle and tighten the remaining bolts.
4) Use a torque wrench to apply the specified torque to bolt “A”.
5) Using the same sequence, crisscross around the bolt circle and apply an equal torque to the remaining bolts.

Lubrication Information

General Properties

The lubricant used in Torque-Lock ™ brakes should be ISO VG. 32 hydraulic fluid. Some applications require special considerations; consult the machine manufacturer and Oerlikon Fairfield for more additional information.

Maintenance

An initial oil change should be made after the first 50 hours of operation. Subsequent oil changes should be made at 1,000 hour intervals or annually, whichever comes first.

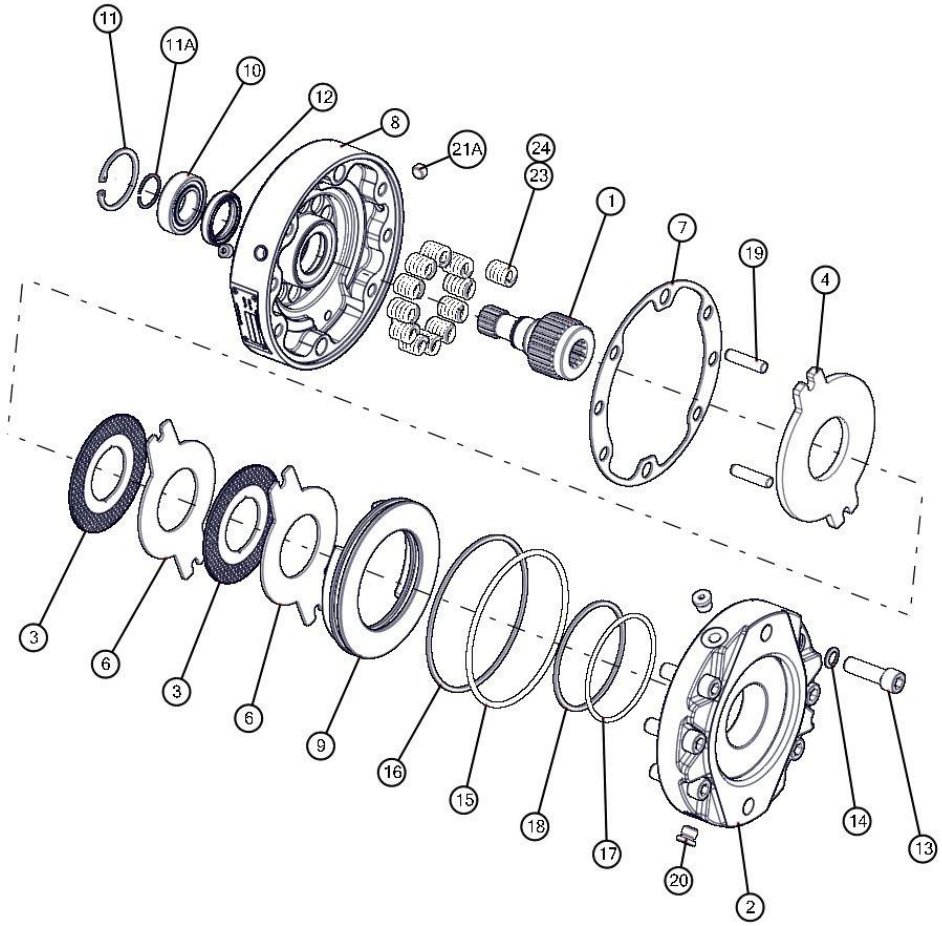
Oil temperatures should be not higher than 160° to 180°F for continuous operation, and no higher than 200°F for intermittent operation. For special applications, high horsepower, high speeds or wide temperature changes, please consult Oerlikon Fairfield.

Oil Fill Level

When the Torque-Lock ™ unit is mounted horizontally, unless otherwise specified, the gearbox should be filled half-full of oil, or 2.4 fl.-oz. 4.9 cu-in [80cc].
Release volume is .7 cu-in [11.5cc].
Vertically mounted Torque-Hub® units may require special lubrication procedures. Please contact Oerlikon Fairfield for vertically mounted applications.

DISASSEMBLY

Main Disassembly



1) Remove the NPT Plugs (21A) and drain the oil.
2) Place the brake on the bench with the shaft down, supported on a fixture that does not allow the output shaft to contact the bench.
3) Remove Socket Head Cap Screws (13) and Lock Washers (14). Remove the cap screws as evenly as possible and note that there is spring pressure pushing on the Piston Housing (2)
4) Remove the O-ring plugs (20).
5) Remove the Piston Housing (2) which will contain the Piston (9) and associated O-rings.
6) To remove the Piston (9), replace one of the O-ring Plugs (20). Use air pressure in the other brake port and push the Piston (9) out of the Piston Housing (2).
7) Remove the O-rings and Back-up Rings (15), (16), (17) and (18).
8) Remove the Gasket (7) from the Spring Housing (8).
9) Remove the Brake Stators (6) and Brake Rotors (3) from the Spring Housing (2).

10) Remove the Pressure Plate (4) from the Spring Housing (2).

11) Remove the Springs (23) and or (24).

12) Remove the Dowel Pins (19) from the Spring Housing (2).

13) Turn the brake over and support it such that the Brake Shaft (1) can be pushed out of the Spring Housing (2) without contacting the bench.

14) Using retaining ring pliers, carefully remove the Retaining Ring (11A) from the Brake Shaft (1)

15) Press the Brake Shaft (1) out of the Ball Bearing (10) out of the Brake.

16) Using retaining ring pliers, carefully remove the Retaining Ring (11) from the Spring Housing (2).

17) Turn the brake over and press the Ball Bearing (10) from the Spring Housing (2)

18) Drive the Seal (12) from the Spring Housing (2)

This concludes the Main Disassembly.

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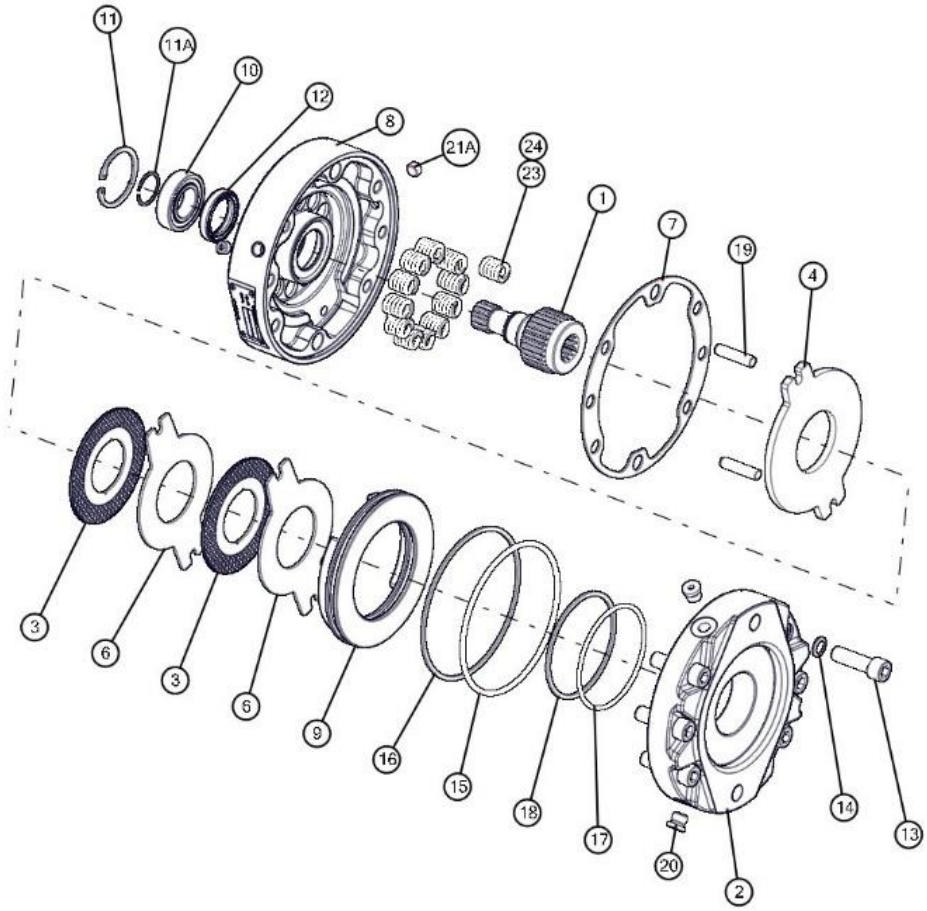
ASSEMBLY

Main Assembly



1) Press the Seal (12), with the spring down, into the Spring Housing (8) to the correct depth with the seal tool. Oil the seal lip.

2) Install the Ball Bearing (10) on the outer race into the Spring Housing (8). The bearing must be seated against the bottom of the counter bore.

3) Turn the Spring Housing (8) over, support the inner race of the bearing and allow sufficient clearance for the Brake Shaft (1) to be pressed thru. Apply Loctite® 603 to the bearing bore. Press the Brake Shaft (1) thru the bearing until the shaft shoulder is solid against the bearing inner race. Be sure to support the inner race of the bearing.

4) Turn the Spring Housing over and install the Retaining Ring (11A) onto the Brake Shaft (1). Install Retaining Ring (11) into the bearing counter bore.

5) Turn the Spring Housing (8) over and install Dowel Pins (19) into the Spring Housing.

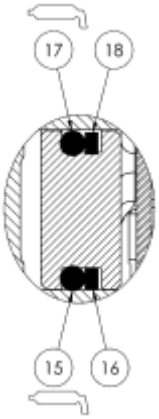
6) Install the correct number and combination of springs (23) and (24) into the counter bores of Spring Housing (8). If Spring (23) is required, note the position in the diagram.

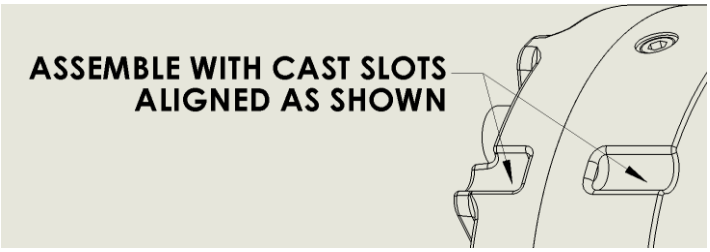
7) Install Pressure Plate (4) onto the springs. Insure that the slots on the pressure plate are aligned with the dowel pins.

8) Install the Brake Rotors (3) and Brake Stators (6) in accordance to the above exploded view. The rotors and stators must alternate as shown above.

9) Grease and install O-ring (17) and Back-up ring (18) into the inner groove of the Piston (9). Insure the back-up ring is in the correct location.

10) Grease and install O-ring (15) and Back-up ring (16) into the outer groove of the Piston (9). Insure the back-up ring is in the correct location.





11) Install the Piston (9) with the O-rings into the Piston Housing (2), being sure to orient the piston relative to the brake stators. The cast slots must be in line with the Dowel Pins (19). Be sure not to cut the O-rings during installation of the piston.

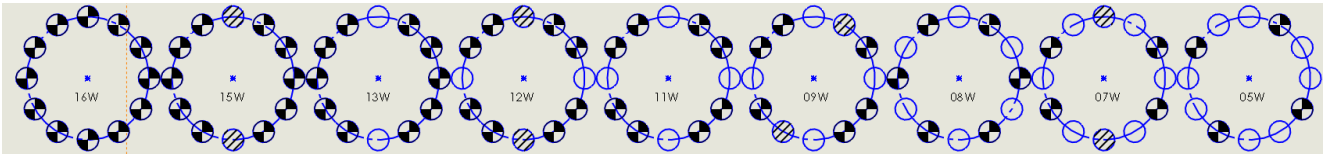
12) Install Gasket (7) into Spring Housing (8).

13) Install Piston Housing subassembly onto Spring Housing, be sure to align the dowel pins. Also insure that the CAST SLOTS in the Spring Housing (8) and Piston Housing (2) are aligned.

14) Install Lock Washers (14) and Socket Head Bolts (13) thru the Piston Housing (2) into the Spring Housing (8). Tighten the socket-head bolts down evenly, compressing the springs. Once the piston housing and the spring housing have come together, torque the Socket Head Bolts (13) to 55-60 ft.-lbs. as shown on page 7.

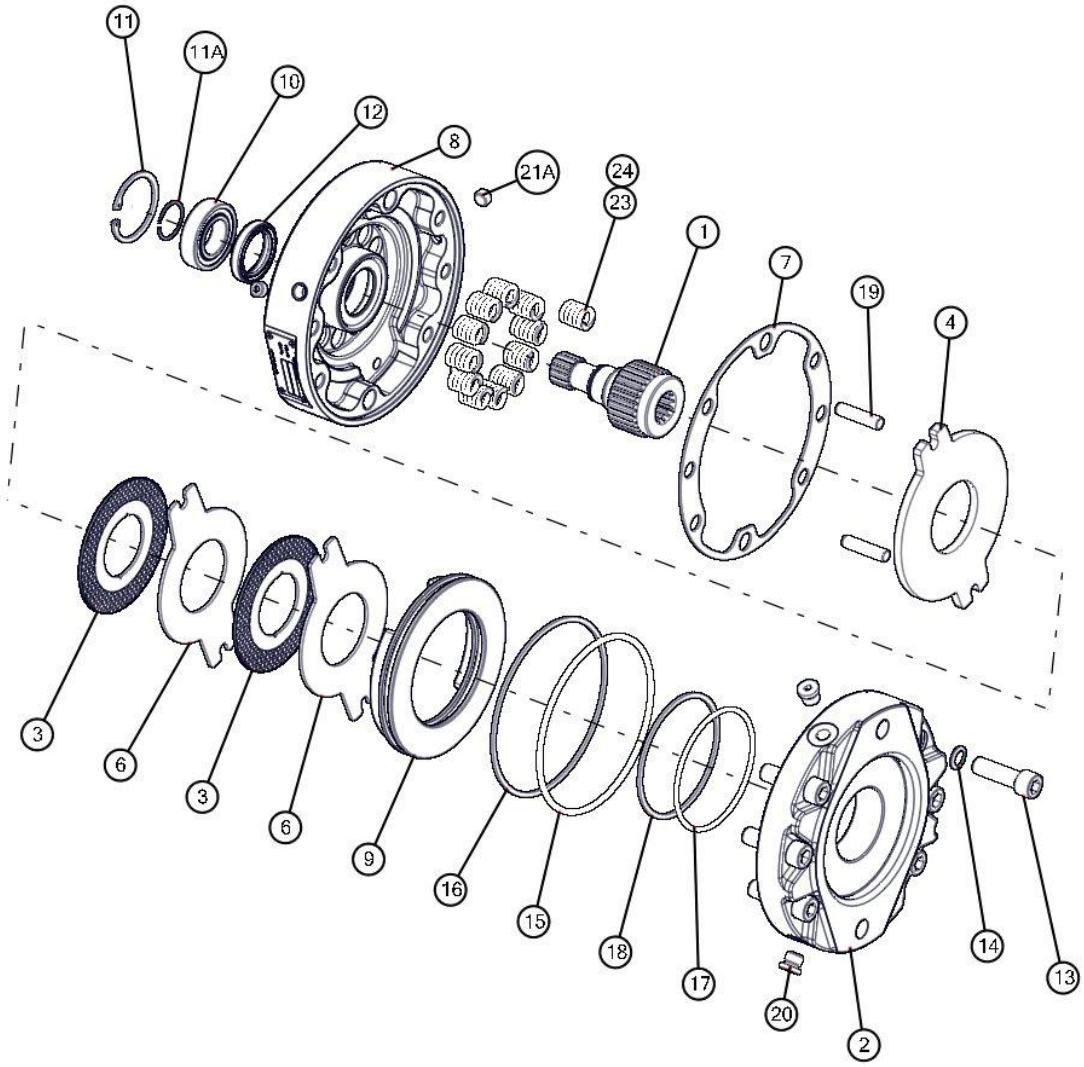
15) Install one Oil Plug (20). Apply hydraulic pressure to the empty brake port and check the release pressure per page 5.

SPRING ASSEMBLY CHART



This concludes the Main Assembly.

Assembly Drawing



Parts List

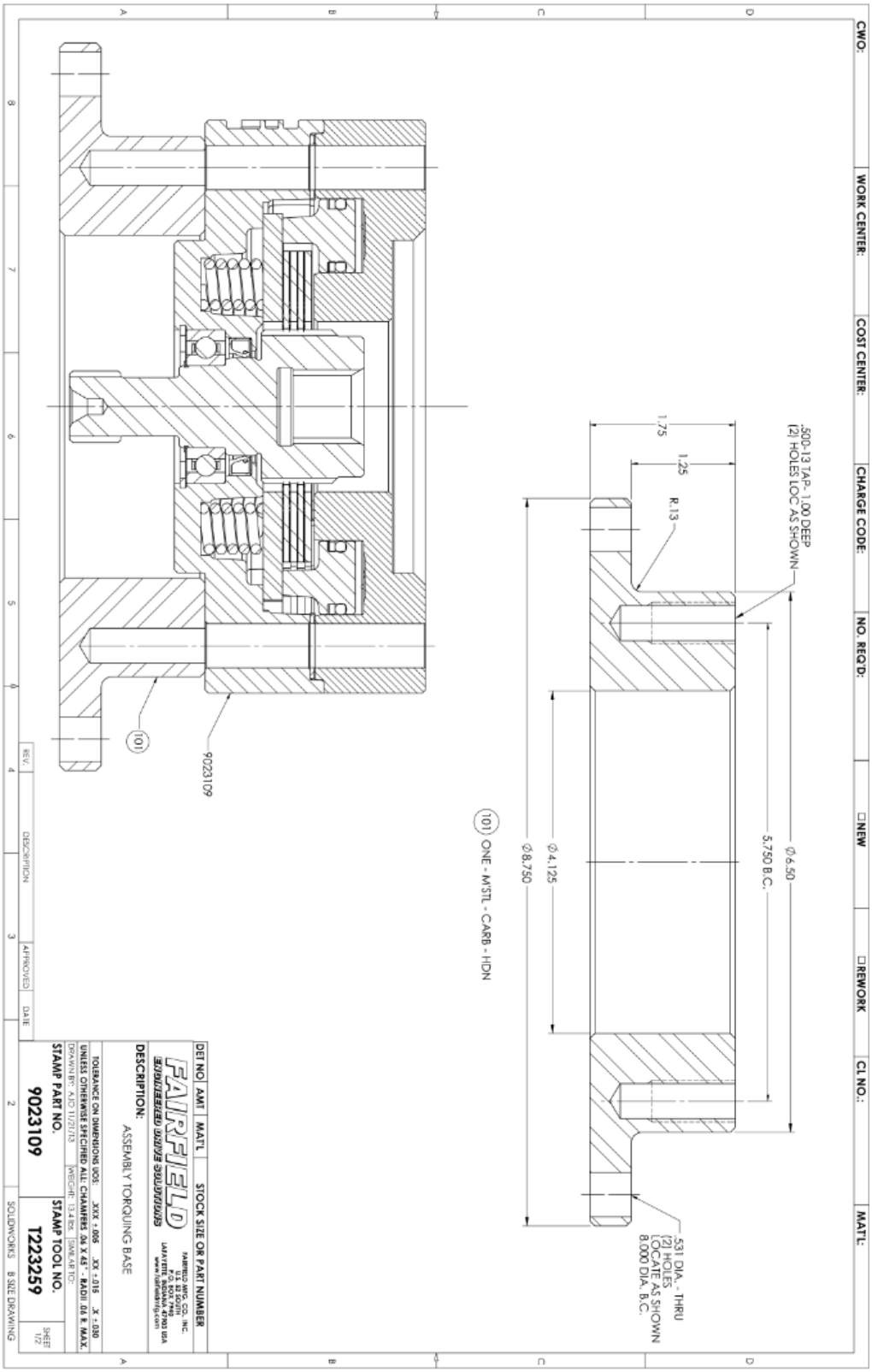
	Item	Qty.	Description
	1	1	BRAKE SHAFT
	2	1	PISTON HOUSING
▲	3	2	BRAKE ROTOR
▲	4	1	PRESSURE PLATE
▲	6	2	BRAKE STATOR
▲ ○ ⌂	7	1	GASKET
	8	1	SPRING HOUSING
	9	1	BRAKE PISTON
⌂	10	1	BALL BEARING
⌂	11	1	RETAINING RING
⌂	11A	1	RETAINING RING
○ ⌂	12	1	SEAL
	13	6	SOCKET HEAD CAP SCREW
	14	6	LOCK WASHER
○	15	1	O-RING
○	16	1	BACK-UP RING
○	17	1	O-RING
○	18	1	BACK-UP RING
	19	2	DOWEL PIN
	20	2	O-RING PLUG
	21A	2	NPT PLUG
▶	23/24	CHART	SPRING

QTY ITEM 23	QTY ITEM 24	BRAKE PART No.
12	0	TLH1333316W
10	2	TLH1333315W
10	0	TLH1333313W
8	2	TLH1333312W
8	0	TLH1333311W
6	2	TLH1333309W
6	0	TLH1333308W
4	2	TLH1333307W
4	0	TLH1333305W

Service Parts

▲ FRICTION DISC KIT	**AMTLH13WA**
► SPRING KIT	**AMTLH03B3**
○ SEAL KIT	**AMTLH03C1**
⌂ BEARING KIT	**AMTLH03D1**

Assembly Tools
SUPPORT TOOL



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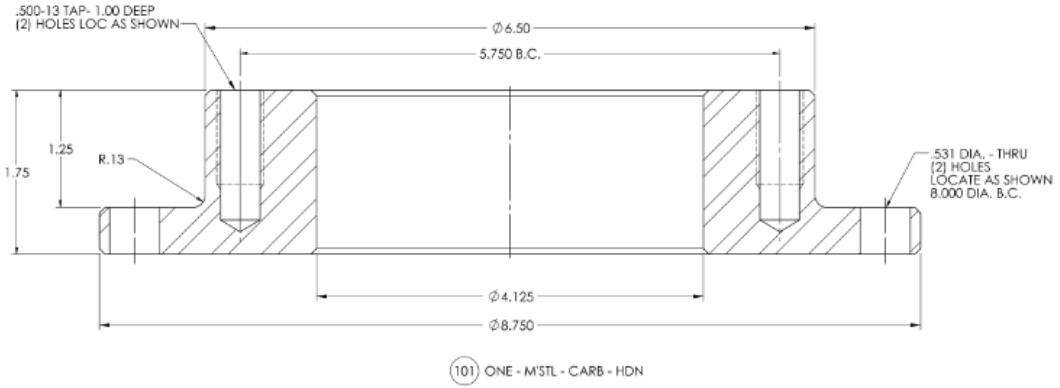
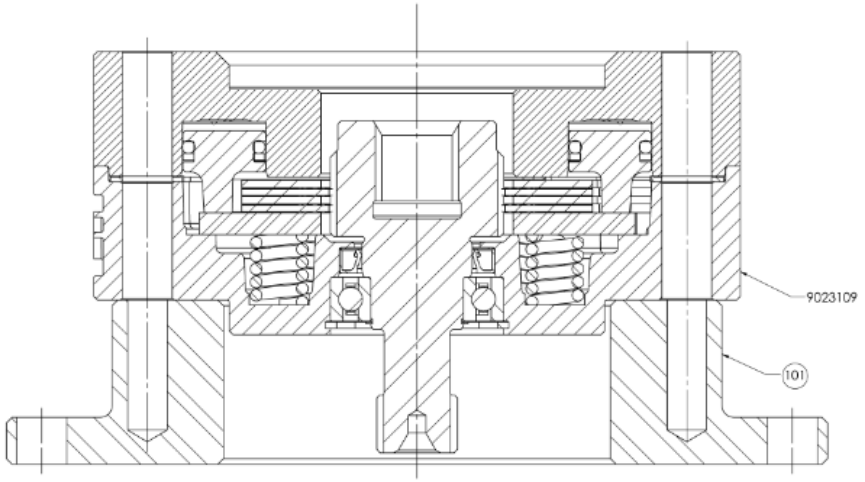


(101) ONE - M'STL - CARB - HDN



DET NO	AMT	MAT'L	STOCK SIZE OR PART NUMBER

FAIRFIELD ENGINEERED DRIVE SOLUTIONS

FAIRFIELD MFG. CO., INC.
U.S. 52 SOUTH
P.O. BOX 7940
LAFAYETTE, INDIANA 47903 USA
www.fairfieldmfg.com

DESCRIPTION: ASSEMBLY TORQUING BASE

TOLERANCE ON DIMENSIONS UOS: .XXX ±.005 .XX ±.016 .X ±.030
UNLESS OTHERWISE SPECIFIED ALL: CHAMFERS .06 X 45° - RADII .06 R. MAX.

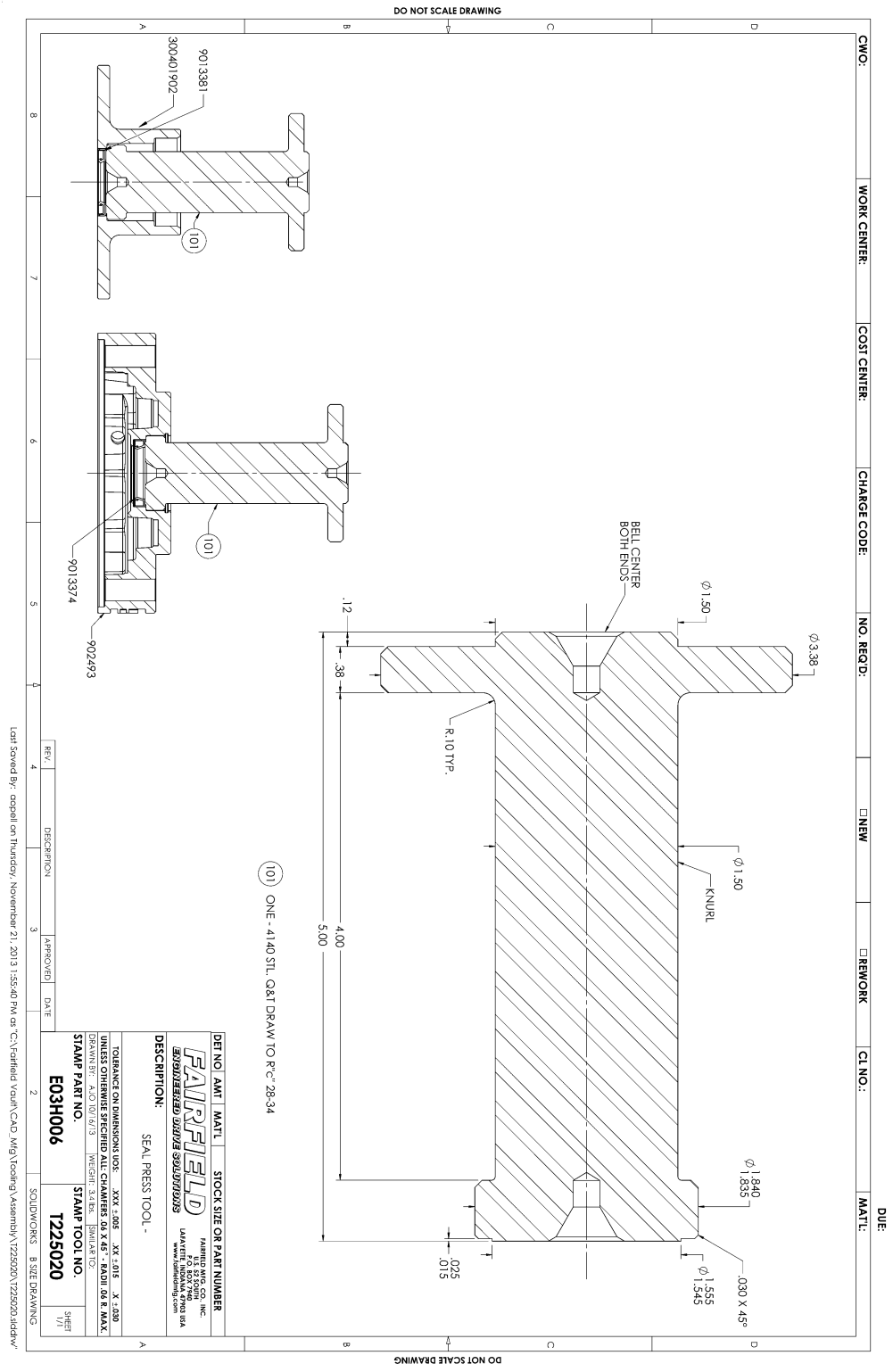
DRAWN BY: AJD 11/21/13 | WEIGHT: 13.4 lbs. | SIMILAR TO:

STAMP PART NO.	STAMP TOOL NO.	SHEET
9023109	T223259	1/2

REV.	DESCRIPTION	APPROVED	DATE

SOLIDWORKS B SIZE DRAWING

SEAL TOOL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COST CENTER:
CHARGE CODE:
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□NEW
□REWORK
CL NO.:
DUE:
MAT'L:
300401902
901381
(101)
901337
902493
BELL CENTER BOTH ENDS
Ø1.50
Ø3.38
.12
.38
R.10 TYP.
Ø1.50
KNURL
4.00
5.00
Ø1.840 1.835
Ø1.555 1.545
.030 X 45°
.025 .015
(101) ONE - 4140 STL. Q&T DRAW TO R"C" 28-34
REV.
DESCRIPTION
APPROVED
DATE
DET NO.
AMT.
MAT'L
STOCK SIZE OR PART NUMBER
FAIRFIELD
ENGINEERED DRIVE SOLUTIONS
FAIRFIELD MFG. CO., INC.
P.O. BOX 7448
LAFAYETTE, INDIANA 47903 USA
www.fairfieldmfg.com
DESCRIPTION:
SEAL PRESS TOOL -
TOLERANCE ON DIMENSIONS UOS: .XXX ±.005 .XX ±.015 .X ±.030
UNLESS OTHERWISE SPECIFIED ALL CHAMFERS .06 X 45° - RADII .06 R. MAX.
DRAWN BY: AJO 10/ 6/13
WEIGHT: 3.4 lbs
SIMILAR TO:
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E03H006
STAMP TOOL NO.
T225020
SHEET 1/1
SOLIDWORKS
B SIZE DRAWING
DO NOT SCALE DRAWING
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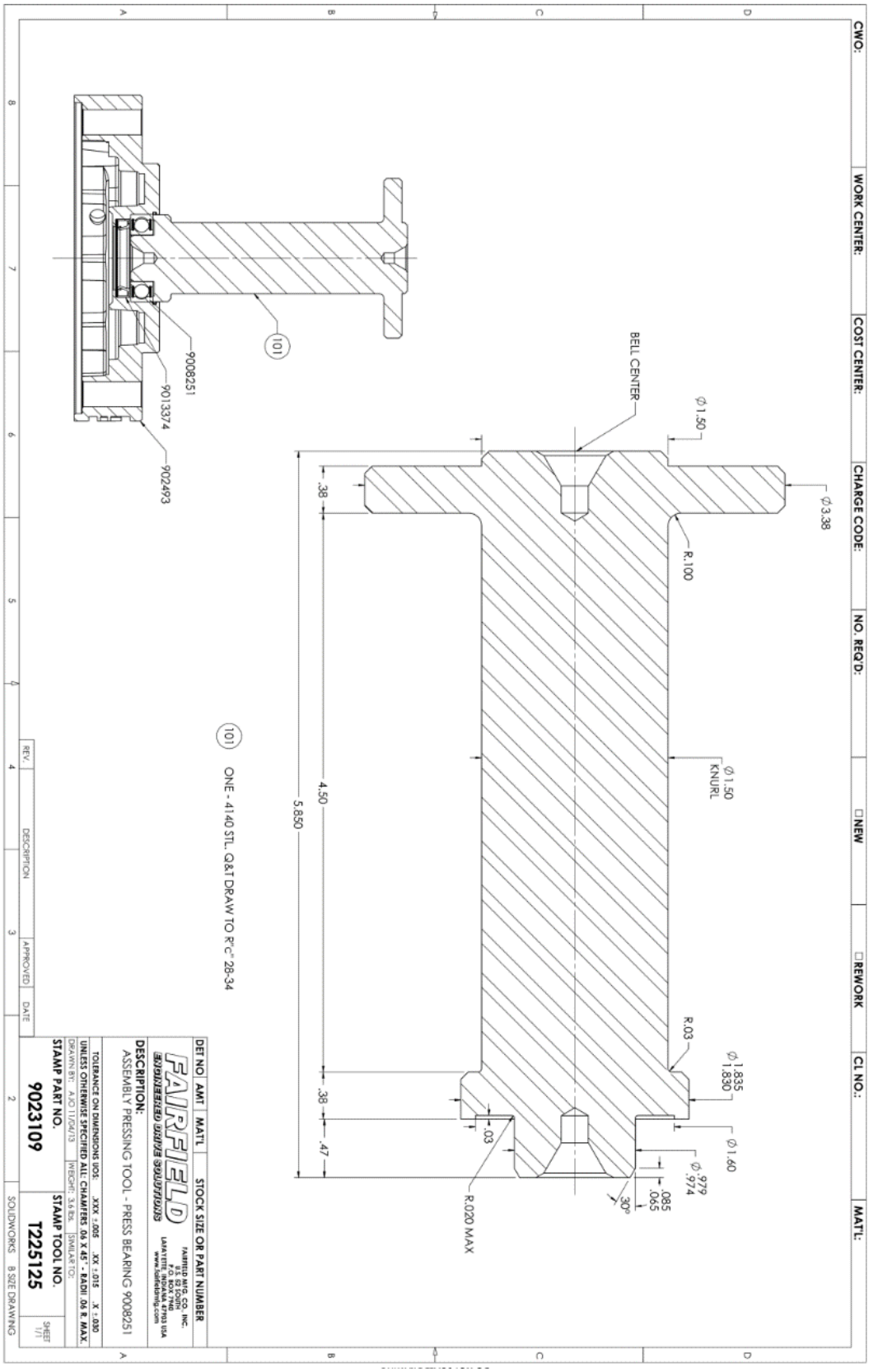
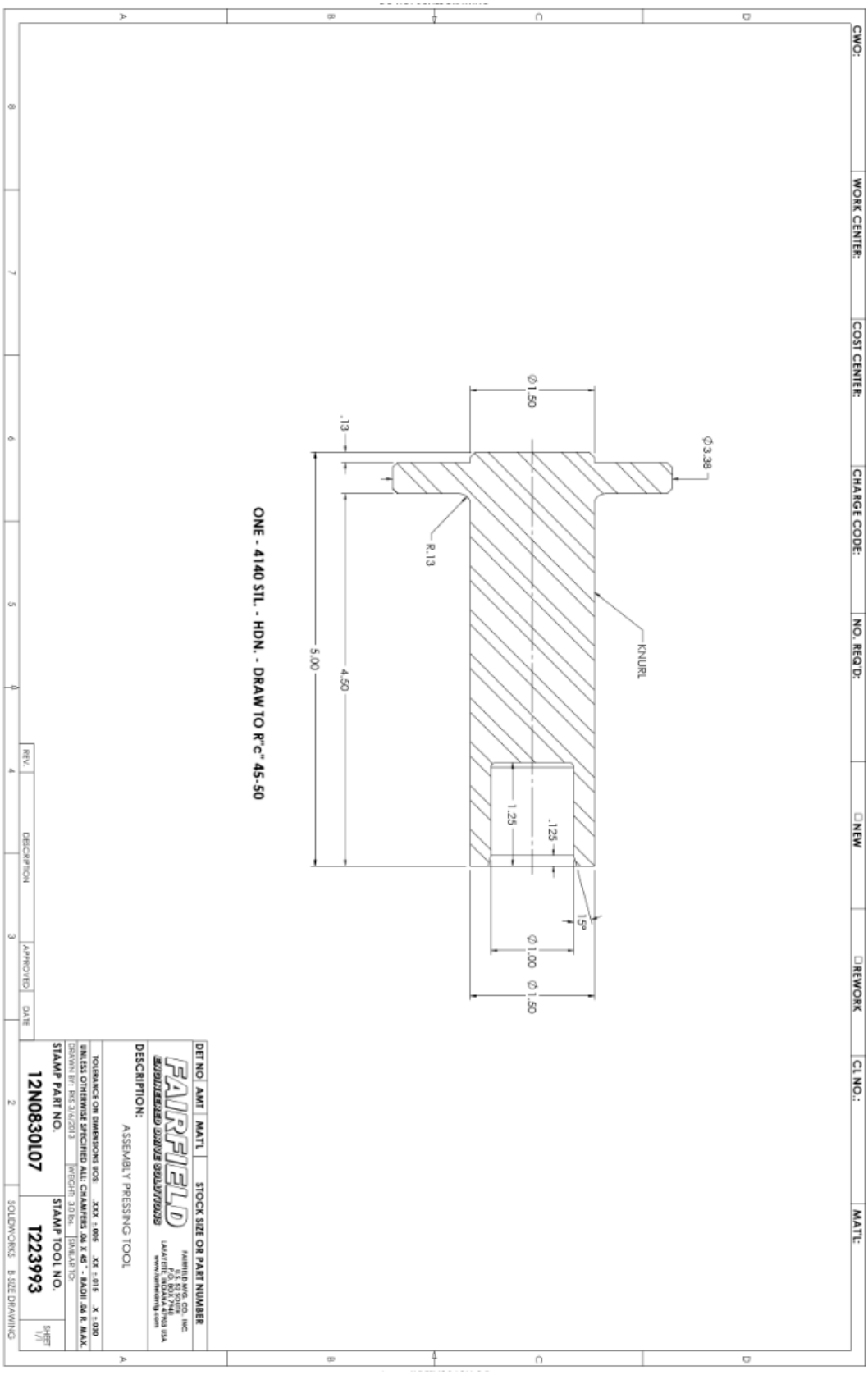
BEARING TOOL



SHAFT TOOL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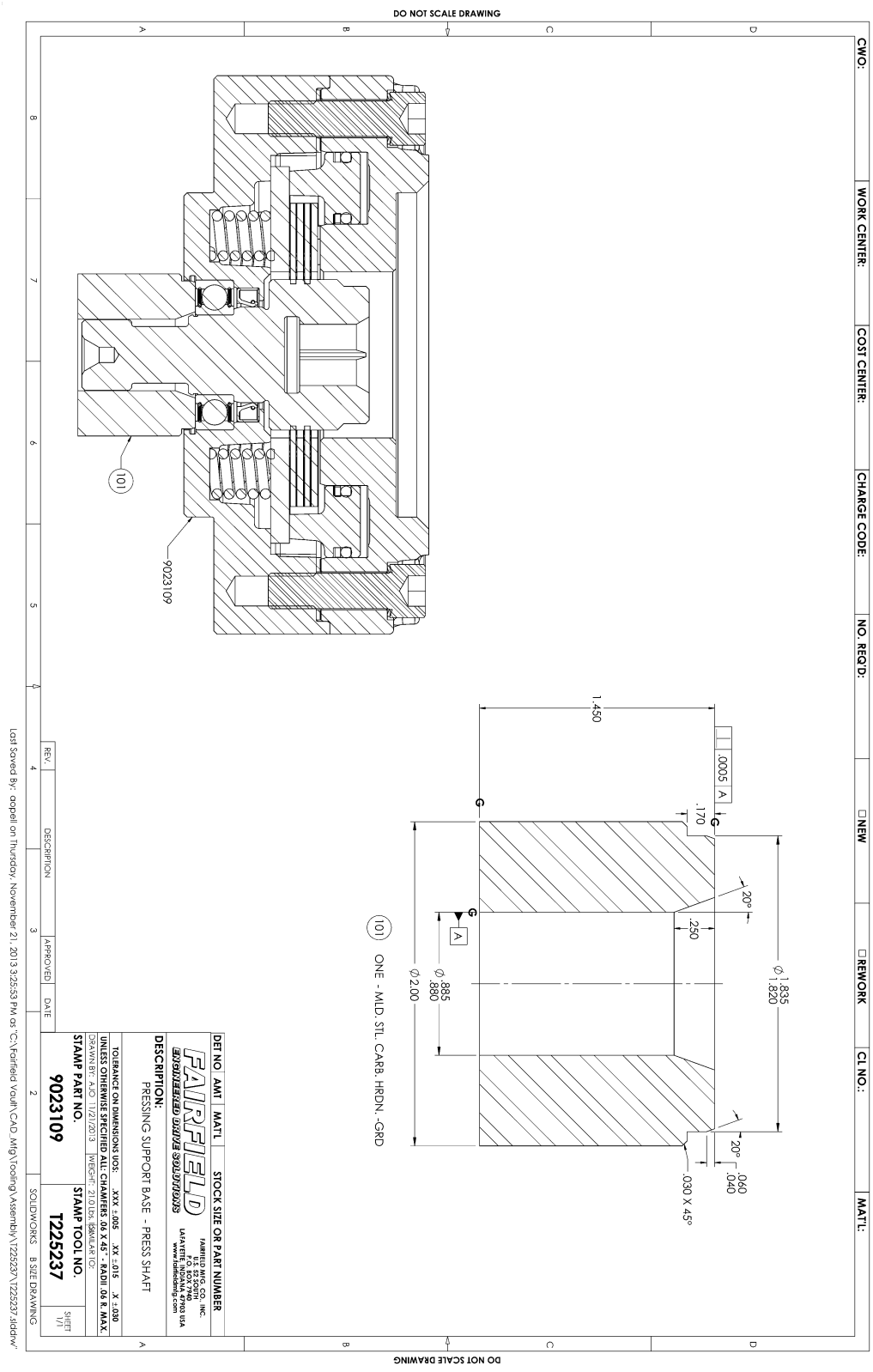
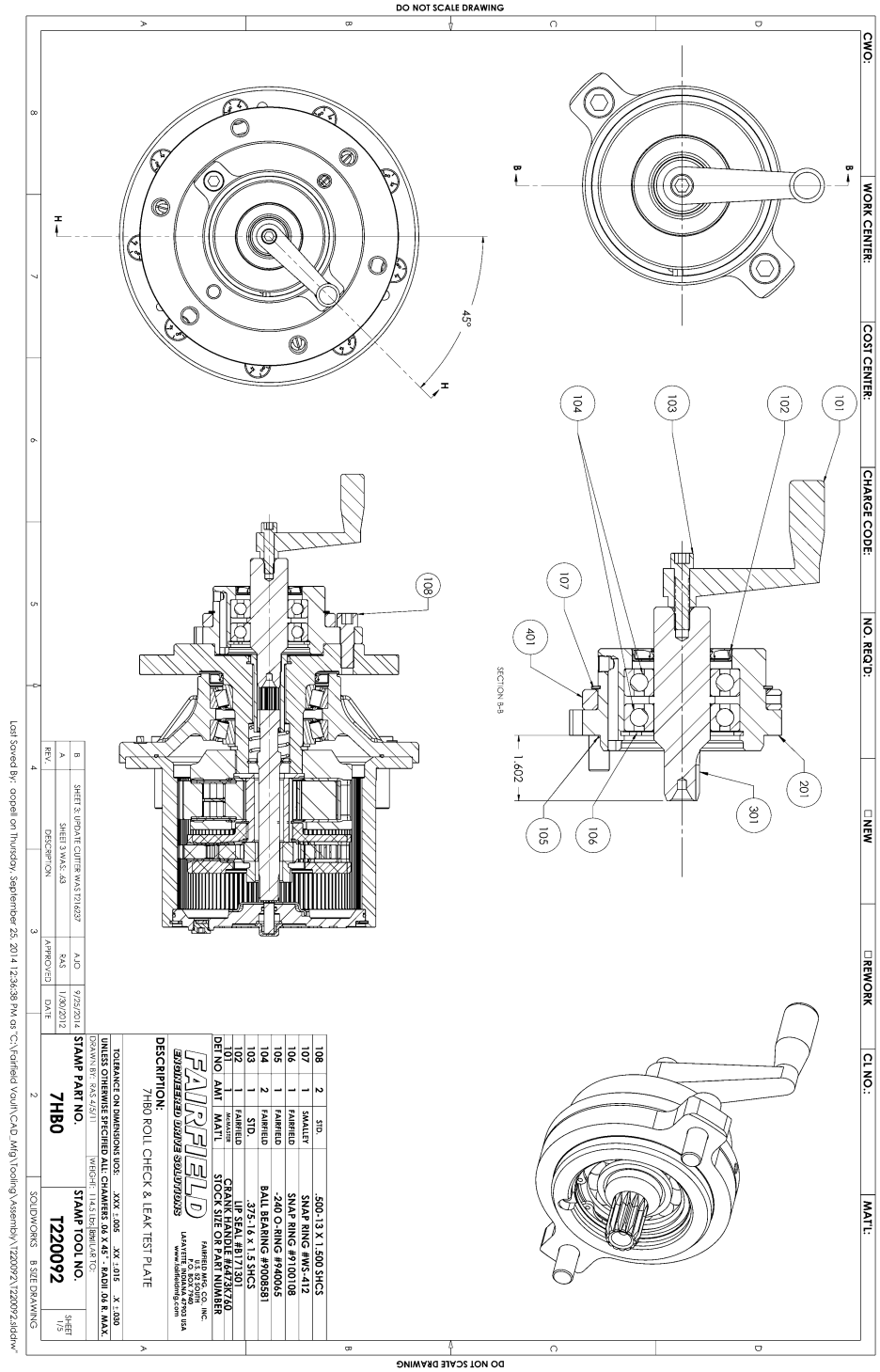
5.00
4.50
1.25
.125
15°
Ø1.00
Ø1.50
ONE - 4140 STL. - HDN. - DRAW TO R"c" 45-50
DET NO.
AMT
MATL
STOCK SIZE OR PART NUMBER
FAIRFIELD
DESCRIPTION:
ASSEMBLY PRESSING TOOL
STAMP PART NO.
12N08301107
STAMP TOOL NO.
T223993
SOLIDWORKS B SIZE DRAWING

SHAFT SUPPORT TOOL



LEAK/ROLL-TEST FIXTURE



REV.	DESCRIPTION	APPROVED	DATE
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A	SHEET 3 WAS: -A3	RAS	1/30/2012

DET. NO.	AMT	MAT'L	DESCRIPTION
108	2	STD.	.500-13 X 1.500 SHCS
107	1	SMALLEY	SNAP RING #WS-412
106	1	FAIRFIELD	SNAP RING #9100108
105	1	FAIRFIELD	-240 O-RING #9400065
104	2	FAIRFIELD	BALL BEARING #9008581
103	1	STD.	.375-16 x 1.5 SHCS
102	1	FAIRFIELD	LIP SEAL #B171301
101	1	MCMASTER	CRANK HANDLE #6473K760
			STOCK SIZE OR PART NUMBER

FAIRFIELD MANUFACTURING CO., INC.
LAFAYETTE, INDIANA 47903 USA
www.fairfieldmfg.com

SOLUTIONS SOLUTIONS SOLUTIONS

DESCRIPTION: 7HB0 ROLL CHECK & LEAK TEST PLATE

DRAWN BY: RAS 4/5/11 | WEIGHT: 114.5 lb | BREAK ALL EDGES

STAMP PART NO. 7HB0 | **STAMP TOOL NO.** T220092

UNLESS OTHERWISE SPECIFIED: ALL CHAMFERS .04 X 45° - RADII .04 R. MAX. TOLERANCE ON DIMENSIONS ±/2S: .XXX ±.005 .XX ±.015 .X ±.030

SHEET 1/5 | SOLIDWORKS B SIZE DRAWING

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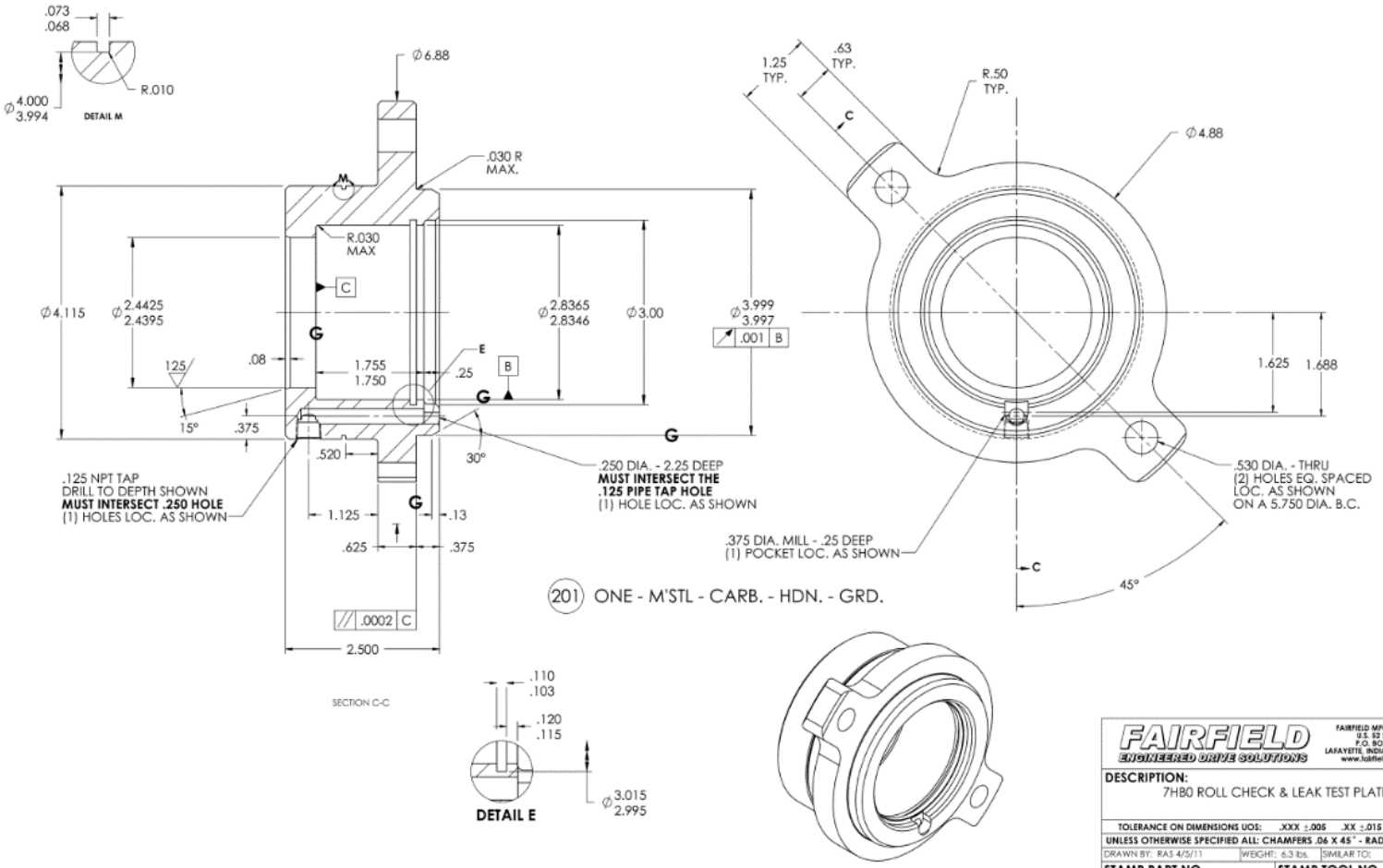

201 ONE - M'STL - CARB. - HDN. - GRD.

FAIRFIELD ENGINEERED DRIVE SOLUTIONS

FAIRFIELD MFG. CO., INC.
U.S. 52 SOUTH
P.O. BOX 7940
LAFAYETTE, INDIANA 47903 USA
www.fairfieldmfg.com

DESCRIPTION:
7HB0 ROLL CHECK & LEAK TEST PLATE

TOLERANCE ON DIMENSIONS UOS: .XXX ±.005 .XX ±.015 .X ±.030
UNLESS OTHERWISE SPECIFIED ALL: CHAMFERS .06 X 45° - RADII .06 R. MAX.

DRAWN BY: RAS 4/5/11	WEIGHT: 6.3 lbs.	SIMILAR TO:

STAMP PART NO.	STAMP TOOL NO.	SHEET
7HB0	T220092	2/5

8 | 7 | 6 | 5 | 4 | 3 | 2 | SOLIDWORKS B SIZE DRAWING

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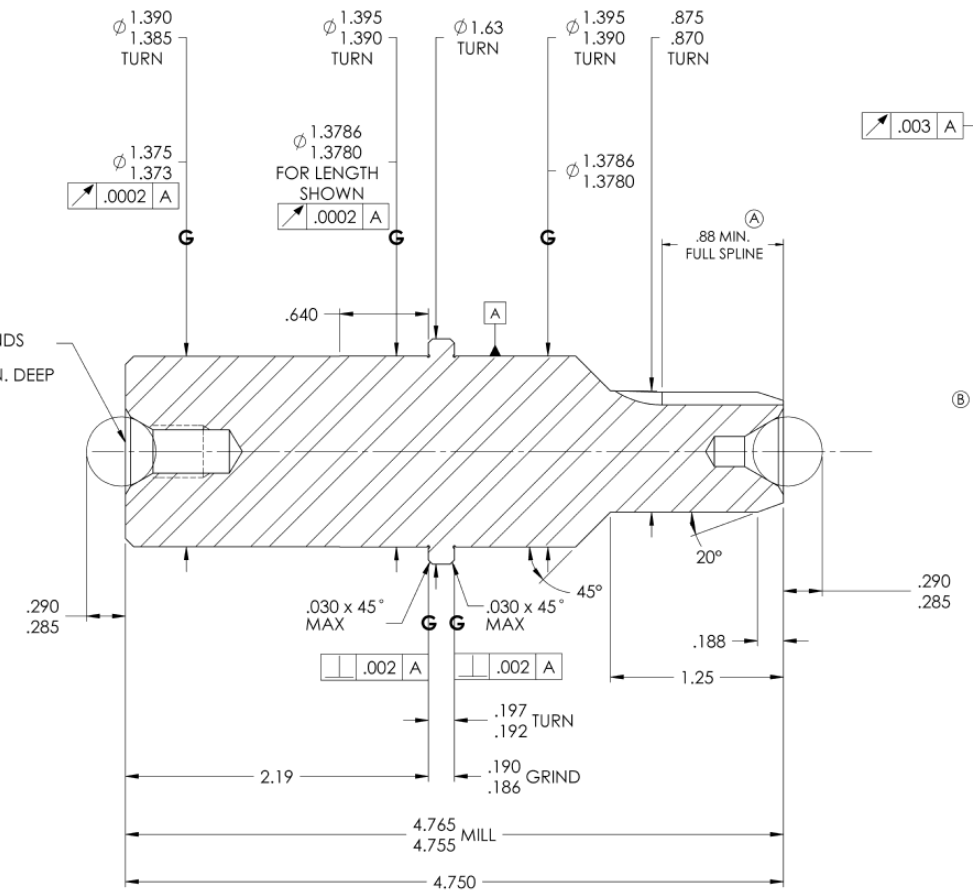


301 ONE - M'STL - CARB - HDN - GRD

EXTERNAL INVOLUTE SPLINE DATA

PER ANSI B92.1-1970
APPROVED BY HOLLINGSWOX 02/14/11

TYPE	FILLET ROOT SIDE FIT		
TOLERANCE CLASS	6		
NUMBER OF TEETH			13
NORMAL DIAMETRAL PITCH			16.00/32.00
NORM PRESS ANG (DEG MIN SEC)			30° 0' 0"
NORM PRESS ANG (DEC. DEG.)			30.0000°
PITCH DIAMETER			0.8125
BASE CIRCLE DIAMETER			0.7036
FORM DIA	0.7460	ROLL ANGLE	20.18°
MINOR DIAMETER MIN			0.6720
ADDENDUM			0.0313
WHOLE DEPTH			0.1015
PIN DIAMETER			0.12000
MIN MEAS OVER PINS			0.9843
MAX MEAS OVER PINS (REF)			0.9867
MAX EFF CIRC TOOTH TKS			0.0982
MIN EFF CIRC TOOTH TKS (REF)			0.0965
MIN ACT CIRC TOOTH TKS			0.0945
MAX ACT CIRC TOOTH TKS (REF)			0.0962

Ⓑ TOOLS:
T-224398 MILLING CUTTER
T-114474 GO SPLINE GAGE
MILL TO LOW LIMIT

FAIRFIELD
ENGINEERED DRIVE SOLUTIONS

FAIRFIELD MFG. CO., INC.
U.S. 52 SOUTH
P.O. BOX 7940
LAFAYETTE, INDIANA 47903 USA
www.fairfieldmfg.com

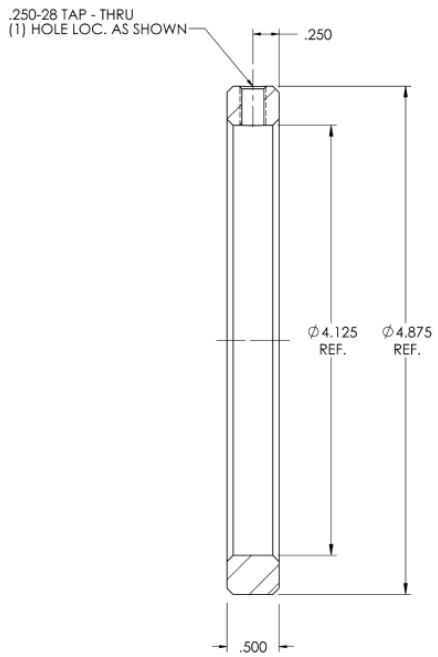
DESCRIPTION:
7HB0 ROLL CHECK & LEAK TEST PLATE

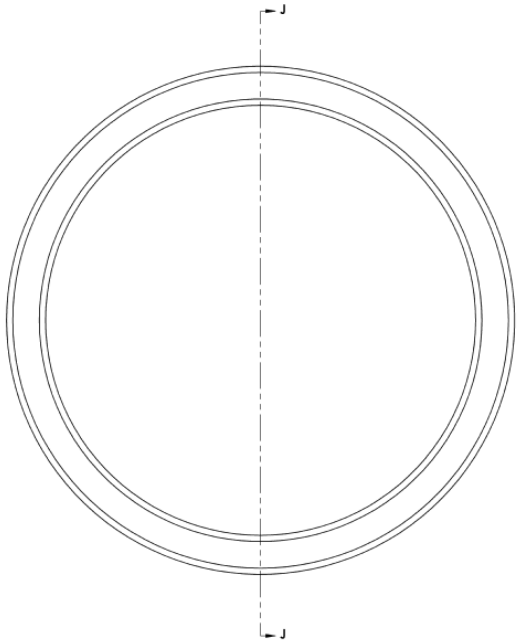
TOLERANCE ON DIMENSIONS UOS: .XXX ±.005 .XX ±.015 .X ±.030
UNLESS OTHERWISE SPECIFIED ALL: CHAMFERS .06 X 45° - RADII .06 R. MAX.
DRAWN BY: RAS 4/5/11 | WEIGHT: 1.6 lbs. | SIMILAR TO:

STAMP PART NO.	STAMP TOOL NO.	SHEET
7HB0	T220092	3/5

SOLIDWORKS B SIZE DRAWING

CWO:	WORK CENTER:	COST CENTER:	CHARGE CODE:	NO. REQ'D:	□NEW	□REWORK	CL NO.:	MAT'L:





(401) ONE - M'STL - 4.875 O.D., .375 WALL DOM TUBING

FAIRFIELD ENGINEERED DRIVE SOLUTIONS

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U.S. 52 SOUTH
P.O. BOX 7940
LAFAYETTE, INDIANA 47903 USA
www.fairfieldmfg.com

DESCRIPTION:
7HB0 ROLL CHECK & LEAK TEST PLATE

TOLERANCE ON DIMENSIONS UOS: .XXX ±.005 .XX ±.015 .X ±.030
UNLESS OTHERWISE SPECIFIED ALL: CHAMFERS .06 X 45° - RADII .06 R. MAX.

DRAWN BY: RAS 4/5/11	WEIGHT: 0.7 lbs.	SIMILAR TO:

STAMP PART NO.	STAMP TOOL NO.	SHEET
7HB0	T220092	4/5

SOLIDWORKS B SIZE DRAWING

Contact Information

Since 1919, Fairfield has been at the forefront of gear and drive design. Fairfield has the people, knowledge and resources to provide solutions for a wide range of application needs.

With manufacturing capabilities in the United States, India and China, Fairfield offers custom gears with spur, helical or bevel forms from 20mm through 2M to AGMA Class 14 standards. We also design and build custom drives for mobile equipment and stationary industrial machinery with torque outputs from 800 Nm to over 4,000,000 Nm. We provide Torque Hub® planetary drives, drop boxes, right angle drives, transfer cases, specialty transmissions, differentials and differential carrier assemblies, housing and custom drive assemblies. We can provide integrated solutions for mechanical, hydraulic or electrically driven systems.

Fairfield is part of Oerlikon AG, a global technology company with over 16,000 employees in 36 countries. Together with our sister firm, Graziano Trasmissioni, Fairfield forms Oerlikon Drive Systems. Our combined technologies enable us to provide fully integrated drive systems from transmissions to final drives for both on- and off-highway vehicles.

For more information, contact Oerlikon Fairfield today.

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